

DETAILED ACTION

Response to Amendment

1. The amendment filed on 02/29/2008 has been entered. Claims 1-5, 7-15 and 17 are pending in the application.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-5, 7, 9, 10, 14, 15 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Rodder et al., (US Pat No. 6,251,761 hereinafter “Rodder”).

Regarding claims 1, 14 and 15 Rodder teaches a transistor comprising;

a substrate (102) including isolation (112) and active regions (col. 2, lines 42-51);

a high-k gate dielectric layer (108) with a species (oxygen), the high-k material layer proximate the substrate (col. 2, lines 59-65);

a gate electrode (110) proximate the high-k gate dielectric layer (col. 4, lines 59-62); and

a conductive buffer layer (TiN) with a species (nitrogen) between the high-k dielectric layer and the gate electrode (col. 2, line 42 through col. 5 line 2 and Fig. 1).

Noted that the gate electrode (110) comprises a metal layer overlying a layer of TiN, see col. 4, lines 59-62).

Regarding claim 2, Rodder teaches wherein a transistor (100) is formed from the substrate, the high-k material layer, and the gate electrode (Fig. 1).

Regarding claim 3, Rodder teaches a pre-gate material layer (106) between the substrate and the high-k material layer (col. 2, lines 50-55 and Fig. 1).

Regarding claim 4, Rodder teaches wherein the pre-gate material layer comprises SiON (col. 2, lines 50-55 and Fig. 1).

Regarding claim 5, Rodder teaches wherein the pre-gate material layer has a thickness within the range of 2-10 Angstroms (col. 2, lines 50-55 and Fig. 1).

Regarding claim 7, Rodder teaches wherein the buffer layer (110) comprises TiN (col. 4, lines 59-62).

Regarding claim 9, Rodder teaches wherein the species comprises nitrogen or oxygen (col. 2, line 52 through col. 5 line 2 and Fig. 1).

Regarding claim 10, Rodder teaches wherein the high-k material layer comprises one of Ta₂O₅ (col. 3, lines 55-60).

Regarding claim 17, Rodder teaches wherein the gate electrode comprises polysilicon (col. 3, line 5).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 8 and 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rodder et al., (US Pat No. 6,251,761 hereinafter "Rodder").

Regarding claim 8, Rodder teaches wherein the buffer layer has a thickness of about 200 Angstroms (col. 4, line 62), but does not teach the buffer layer has a thickness of within the range of 10 to 200 Angstroms. Although Rodder's thickness of the buffer layer is not the claimed range (10-200 Angstroms), this does not define patentable over Rodder since the thickness is well known processing variable and the discovery of the optimum or workable range involves only routine skill in the art.

Regarding claims 11-13, Rodder teaches wherein the oxygen-containing high-k material layer (108) has a thickness of about 50-110 Angstroms (col. 2, line 66), but does not teach the high-k material layer has a thickness of within the range of 10 to 200 Angstroms and a dose of implanted species is within the range of 10^{13} - 10^{16} ion/cm². Although Rodder's thickness and implanted dose of the buffer layer is not the claimed range (10-200 Angstroms, 10^{13} - 10^{16} ion/cm²), this does not define patentable over Rodder since the thickness and the species concentration are well known processing variable and the discovery of the optimum or workable range involves only routine skill in the art.

Response to Arguments

6. Applicant's arguments filed 02/29/2008 have been fully considered but they are not persuasive.

In response to applicant's argument that Rodder fails to teach or suggest the limitations recited by amended independent claims 1 and 15 including a high-k gate

dielectric layer including an ionized species; and a conductive buffer layer including an ionized species. The examiner respectfully submits that the high-k gate dielectric layer (108) is made of Ta₂O₅, and the conductive buffer layer (110) is made of TiN, which are the same material used for the high-k gate dielectric layer and the conductive buffer layer in the claimed invention (see col. 3, lines 55-50 and col. 4, lines 59-62). When the claimed and prior art are identical or substantially identical in structure or composition, a *prima facie* case of either anticipation or obviousness has been established. *In re Best*, 195 USPQ 430, 433 (CCPA 1977) and MPEP 2112.01.

Therefore, applicant's arguments are not persuasive and the rejection is proper.

Conclusion

7. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quoc Hoang whose telephone number is (571) 272-

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1780. The examiner can normally be reached on Monday-Friday from 8.00 AM to 5.00 PM.

If attempt to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thao Le can be reached on (571) 272-1708. The fax phone numbers of the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications and (571) 273-8300 for After Final communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Quoc D Hoang/

Primary Examiner, Art Unit 2892